



Pine Bend Refinery

MAR 19 2013

ENVIRONMENTAL DEPARTMENT

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March 14, 2013

Ms. Jennifer Darrow
US EPA Region 5
77 West Jackson Boulevard
Mail Code: AR-18J
Chicago, IL 60604-3507

**RE: Flint Hills Resources Pine Bend, LLC
Cultural Resource Assessment in Support of the #3 Crude/Coker Improvements Permit
Application**

Dear Ms. Darrow:

Please find the attached report providing Flint Hills Resources Pine Bend Refinery's Cultural Resource Assessment in support of the #3 Crude/Coker Improvements PSD Permit Application submitted to the Minnesota Pollution Control Agency (MPCA) on November 16, 2012. This information is provided for your use in following the requirements of Section 106 of the National Historic Preservation Act.

The PSD permit review is currently underway at the MPCA. We anticipate that MPCA will prefer to have the Section 106 consultation completed prior to July 2013, which is the estimated timeframe that the public comment period will begin. Construction for the projects is scheduled to begin starting in November 2013 in order to accommodate process unit shut down and turnaround windows starting in February 2014.

If you have any questions about this submittal, please contact me at michael.sinclair@fhr.com (651) 437-0625, or Sue Anderson at sue.anderson@fhr.com or (651) 438-1214.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mike Sinclair'.

Mike Sinclair
Senior Air Permitting Engineer
Flint Hills Resources Pine Bend Refinery

Encl.

cc: Ms. Genevieve Damico, USEPA
Mr. Tarik Hanafy, MPCA

Cultural Resource Assessment

***Flint Hills Resources Pine Bend, LLC
Rosemount, Minnesota***

***In Support of #3 Crude/Coker Improvements Permit
Application***

***Prepared for
Flint Hills Resources***

March 2013

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**Cultural Resource Assessment
Flint Hills Resources Pine Bend, LLC
Rosemount, Minnesota**

In Support of #3 Crude/Coker Improvements Permit Application

March 2013

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Abbreviations and Acronyms

APE	Area of Potential Effect
BACT	Best Available Control Technology
BE	Biological Evaluation
CAA	Clean Air Act
CO	Carbon monoxide
CO ₂ e	CO ₂ equivalent (for GHG)
CFR	Code of Federal Regulation
EAW	Environmental Assessment Worksheet
ESA	Endangered Species Act
ESL	Effects Screening Levels
FHR	Flint Hills Resources Pine Bend
GHG	Greenhouse gases
HAP	Hazardous Air Pollutant
H ₂ S	Hydrogen sulfide
km	kilometer
m	meter
MEPA	Minnesota Environmental Policy Act
MnDOT CRU	Minnesota Department of Transportation Cultural Resources Unit
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standard
NH ₃	Ammonia
NHPA	National Historic Preservation Act
NO _x	Nitrogen oxides
NRHP	National Register of Historic Properties
NSPS	New Source Performance Standards
NSR	New Source Review
PAH	Polycyclic Aromatic Hydrocarbon
PM/PM ₁₀ /PM _{2.5}	Particulate Matter / PM less than 10 microns in size / PM less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
psig	pound-force per square inch gauge
PTE	Potential to Emit

RSC	Reduced Sulfur Compounds
SAM	Sulfuric Acid Mist
SCR	Selective Catalytic Reduction
SER	Significant Emission Rate
SO ₂	Sulfur dioxide
SHPO	State Historic Preservation Officer
SIL	Significant Impact Level for PSD Class II areas
tpy	tons per year
USEPA	U.S. Environmental Protection Agency
µg/m ³	microgram per cubic meter
ULNB	Ultra-low NO _x Burners
VOC	Volatile organic compound
VTB	Vacuum tower bottoms

Executive Summary

Flint Hills Resources (FHR) is proposing modifications to its Pine Bend Refinery located in Rosemount, Dakota County, Minnesota (Figure 1). The proposed modifications require an air permit under the Prevention of Significant Deterioration (PSD) program pursuant to the federal Clean Air Act (CAA). The Minnesota Pollution Control Agency (MPCA) has been delegated authority by the U.S. Environmental Protection Agency (USEPA) to issue PSD permits under the federal PSD regulations set forth at 40 C.F.R. Part 52. The action by MPCA of issuing a federal PSD permit under its delegated authority qualifies as an “agency action” that triggers the consultation requirements of Section 106 of the National Historic Preservation Act (NHPA). This Cultural Resource Assessment provides the information necessary to support MPCA’s obligations under Section 106.

Existing Site Description

FHR operates the Pine Bend Refinery located in Rosemount, Dakota County, Minnesota. The Pine Bend Refinery is a major supplier of transportation fuels and energy products to Minnesota and the Upper Midwest. The Pine Bend Refinery currently has a crude oil processing capacity of some 320,000 barrels per day.

Project Description

This #3 Crude/Coker Improvements permit action covers two separate projects and one emissions reduction project. The following summarizes the location and context of the improvements.

The #3 Crude Unit Improvements Project Overview. The #3 Crude Unit Improvements Project includes upgrades to the #3 Crude Unit and provides additional cooling water capacity. This project will result in the upgrade of the #6 Cooling Tower, the construction of a new #7 Cooling Tower, or both, to provide additional cooling water capacity. FHR will replace the 25 Crude Unit Charge Heater (25H1) with a new heater (new 25H2) equipped with ultra-low NO_x burners (ULNB) and selective catalytic reduction (SCR) technology and improve heater efficiency via air preheat design, all of which will result in reduced actual nitrogen oxide (NO_x) emissions. The new 25H2 Heater will be installed in the same general location as the old 25H1 Heater. This installation of the 25H2 Heater will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place. The #2 Crude Unit Charge Heater (11H6) will also be upgraded by installation of SCR technology and

improved heater efficiency via air preheat design. Additionally, an upgrade will be completed to augment an existing cooling tower (#6 Cooling Tower) with additional cells that will result in a minor addition to the existing footprint of the #6 Cooling Tower. The minor addition to the existing footprint will be within the previously disturbed equipment, operations, and maintenance footprint of the refinery. Lastly, the addition and construction of the #7 Cooling Tower will disturb a previously disturbed area within the equipment, operations, and maintenance footprint of the refinery. Excavation will be necessary to construct a permanent 3-foot deep basin beneath the #7 Cooling Tower.

The #3 Coker Improvements Project Overview. The #3 Coker Unit Improvements Project involves replacing two (2) heaters (Heaters 23H1 and 23H2) with a single heater (23H3) within the same general location within the equipment, operations and maintenance footprint of the refinery. The new heater will have ULNB and SCR, and will take advantage of energy efficient design. Installation of this new heater will eliminate hydrogen sulfide (H₂S) emissions that occur during infrequent, short-term periods (approximately one day each calendar quarter) of heater decoking. Because the #3 Coker Improvements Project which installs a new 23H3 heater is a separate project from the #3 Crude Unit Improvements Project, the project may or may not proceed even if the #3 Crude Unit Improvements Project proceeds. This assessment takes this optionality into account and highlights sections where not proceeding with this project increases potential impacts to be evaluated. Installation of the 23H3 Heater will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place.

The Coker Fuel Gas Sulfur Reduction Project Overview. A third project is being completed to support sulfur dioxide (SO₂) emissions reductions from fired heaters affected by and included within both the #3 Crude Unit Improvements Project and #3 Coker Improvements Project. This third project will be completed if either the #3 Crude Improvements Project or the #3 Coker Improvements Project are completed. Within the gas recovery system of the #3 Coker Unit, FHR proposes to complete physical changes to improve cooling and recovery of sulfur compounds that will directly reduce the sulfur content of produced refinery fuel gas that is routed to the 45 fuel gas system (one of the two fuel gas systems in the refinery). The fuel gas sulfur control project will reduce SO₂ emissions at the combined fuel gas systems (GP116 – the 41 and 45 fuel gas systems). This will involve physical changes to the process equipment but no overall physical changes to the footprint of the refinery (*i.e.*, no associated soil disturbance).

The collective permitted SO₂ and NO_x emissions impact of these changes—shutting down three process heaters, installing two new process heaters and upgrading a third heater with ULNB and SCR technology, implementing an emissions reduction project to reduce sulfur content in fuel gas, and accounting for emissions increases at other equipment resulting from the proposed changes—yields a decrease in SO₂ emissions and a decrease in NO_x emissions.¹

The #3 Crude/Coker Improvements permit is a major modification subject to PSD review for particulate matter (PM, PM₁₀, and PM_{2.5}) and for greenhouse gas (GHG) emissions. Potential air emissions associated with the combined projects indicate that particulate matter (PM, PM₁₀, and PM_{2.5}) and greenhouse gases (GHGs; CO₂e basis) related to combustion of fuel gas exceed the relevant PSD significant emission rates (SER) for these pollutants:

- 1) PM: 31.3 tpy compared to SER of 25 tpy
- 2) PM₁₀: 29.6 tpy compared to SER of 15 tpy
- 3) PM_{2.5}: 28.0 tpy compared to SER of 10 tpy
- 4) GHGs (CO₂-equivalent basis): 419,553 tpy compared to SER of 75,000 tpy.

The PSD Permit Application provides additional details on these emission increases. The permit will result in decreases in actual emissions of NO_x and SO₂. The permit terms include a requirement to shut down three existing heaters which result in NO_x emission reductions that are greater than the projected NO_x emissions increases for the permitted work. While FHR does not utilize these reductions for NSR netting purposes (the increases from the projects alone are less than the NSR significant emission rate), the proposed enforceable requirements to shut down these heaters assures from an impact assessment perspective that the permit will not result in actual emission increases of NO_x.

The fuel gas sulfur control project will reduce sulfur dioxide emissions from firing of fuel gas used in refinery heaters. A proposed permit term requires reductions in the refinery fuel gas SO₂ emissions that more than offset the projected SO₂ increases. As with NO_x, FHR is not performing NSR netting;

¹ For the purposes of NSR applicability, a netting analysis is not conducted so the PSD emission representations in the permit application do not reflect any emission reductions. The above-noted decrease in refinery emissions from the projects is calculated from the project emissions increase under NSR in conjunction with the federally enforceable emissions decreases proposed in this permit action from shutdown units and proposed emissions controls at existing project-affected units.

however, the proposed enforceable requirement that reduce refinery fuel gas SO₂ emissions assures from an impact assessment perspective that the permit will not result in actual emissions increases of SO₂.

Other potential increases in emissions associated with the combined projects include ammonia (20.1 tpy; no PSD SER). Estimated ammonia emissions are associated with the use of selective catalytic reduction (SCR) to control NO_x emissions related to fuel gas combustion. Emission increases for ammonia are assessed further in Section 4.3.4.

Identification of the Area of Potential Effect (APE)

For purposes of MPCA's consultation under Section 106 of the NHPA, an "area of potential effect" is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." 36 C.F.R. § 800.16(d). For purposes of MPCA's consultation with USFWS for purposes of Section 7 of the Endangered Species Act, "direct effects" are to be understood as those "direct or immediate effects of the project on the species or its habitat," U.S. Fish & Wildlife Service, "Section 7 Consultation Handbook" at 4-25 (1998), and "indirect effects" "are caused by or result from the proposed action, are later in time, and are reasonably certain to occur." *Id.* at 4-27. Further, "[i]ndirect effects may occur outside of the area directly affected by the action." *Id.* The federal NHPA regulations set forth the criteria of "adverse effects," which are functionally similar to the Section 7 definitions of direct and indirect effects. *See* 36 C.F.R. § 800.5(a)(1) (setting forth criteria of adverse effect, which are functionally similar to the Section 7 definitions of direct and indirect effects).

Also, in accordance with Minnesota State Historic Preservation Office (SHPO) Section 106 compliance guidance, the definition of adverse effect further assists in the review of potential direct and indirect effects – "Adverse effects can be direct or indirect and include effects that are reasonably foreseeable and cumulative. Typical adverse effects include: demolition or damage; alterations inconsistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, relocation of the property; change in the property's use or setting, introduction of audible, atmospheric or visual elements that diminish the property's significant features; and transfer, sale, or lease of property out of federal ownership or control without appropriate preservation restrictions or covenants."

FHR identified the APE for the projects using the following step-wise approach.

First, FHR identified a Study Area, which is defined as the zone within which potential direct and indirect effects may possibly be discerned. Aside from providing important regional context for the projects, the Study Area sets the outer boundaries for FHR's assessment of direct and indirect effects. FHR concluded that a 3 kilometer-based Study Area comprises an area sufficient to include the receptors of maximum modeled air concentrations and also include an area sufficient to identify the presence of significant cultural resources. (Figure 2)

Second, FHR established a Preliminary APE based on the potential direct effects of the projects. The potential direct effects from the projects include the immediate potential effects of construction and operation of the projects (*e.g.*, ground or habitat disturbance). The direct impacts to land (*i.e.*, ground disturbance) from these projects do not extend outside the existing equipment, operations and maintenance footprint of the refinery and do not involve any additional land conversion activities. Construction of the 25H2 and 23H3 will require further disturbance within the previously-disturbed refinery process area of approximately 1/3 acre each with a depth of approximately 15 feet to install piling/piling cap. The excavation will be backfilled once pile cap is installed. For #6 Cooling Tower upgrades, minimal disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery will occur to provide the staging area for the addition of cells to the #6 Cooling Tower. The #7 Cooling Tower will disturb a previously disturbed area slightly greater than one acre to the east of the #6 Cooling Tower. Excavation will be necessary to construct a permanent 3-foot deep basin beneath the #7 Cooling Tower. There will be no disturbance of currently green or previously undisturbed areas. Therefore, the Preliminary APE was determined to be the existing operations, equipment and maintenance footprint of the refinery.

Last, FHR assessed whether any potential indirect effects within the Study Area should cause the Preliminary APE to be expanded to include an area of indirect effects by assessing the potential effects from air emissions, visual impacts, and water intake or discharge.

Air Emissions. FHR evaluated potential air quality impacts from all criteria pollutants and other relevant pollutants. Table 1 provides a summary of the PSD pollutants that FHR evaluated for their potential to affect cultural resources. The results of quantitative air quality impact assessments show that modeled air concentrations are less than significant impact levels (SILs) for PM₁₀ and PM_{2.5} at and beyond the property boundary. Consequently, the Preliminary APE was not expanded to account for air quality-related indirect effects.

Table 1 Summary of PSD Regulated Pollutants Evaluated for Potential Effects to National Register-Listed, Eligible, or Potentially Eligible Properties

PSD Pollutant	Assessment Method	Results
Particulate matter (PM ₁₀ , PM _{2.5})	Quantitative	Air dispersion modeling shows modeled air concentrations are less than significant impact levels (SILs) at or beyond the Pine Bend Refinery property boundary.
NO _x (and Ammonia (NH ₃))	Qualitative	NO _x emissions less than PSD significant emission rates with emission limits and heater shutdowns that assure an overall reduction in NO _x emissions. Potential for nitrogen deposition from ammonia emissions is de minimis. No indirect effects to cultural resources expected.
SO ₂ , SAM, H ₂ S, RSC	Qualitative	Because all sulfur species have estimated project emissions below the respective PSD significant emission rates, no indirect effects to soil or vegetation are expected. SO ₂ emissions limits and heater shutdowns assure a decrease in SO ₂ emissions and therefore no effects expected from any potential sulfur deposition.

SAM = sulfuric acid mist

RSC = Reduced sulfur compounds

PSD pollutants in Table 1 for which FHR did not perform an assessment include the following:

- Particulate metals. This pollutant is typically not evaluated for potential impacts to cultural resource receptors.
- Volatile organic compounds. This pollutant is typically not evaluated for potential impacts to cultural resource receptors.
- GHGs. Local effects are not expected from these pollutants and they were not evaluated in accordance with Department of the Interior guidelines on considering GHGs in Section 7 consultations (DOI 2008).
- CO. This pollutant is typically not evaluated for potential impacts to cultural resource receptors. Because the estimated emissions for the combined projects (80 tpy) is below the PSD screening rate (100 tpy), no potential ecological impacts are expected and CO was not evaluated.

Visual Impacts. FHR evaluated potential visual impacts within the Study Area resulting from the projects. New structures associated with the projects will be constructed within and amidst the existing equipment, operations, and maintenance footprint of the refinery. Within the footprint of the refinery there is currently a broad distribution of structures 200 feet or greater. The heaters (25H2 and 23H3) will replace the existing heaters (25H1, 23H1 and 23H2) within generally the same location. The heater stacks at the facility are the most prominent visual features. Existing Heater stack 25H1 is approximately 213 feet; existing Heater stacks 23H1 and 23H2 are approximately 190

feet. As proposed, both heaters will be built with stacks at the same height or less than the existing. For the #6 Cooling Tower, there will be no height increase. For the new #7 Cooling Tower, which will be built within and amidst the existing refinery footprint, the proposed height will be less than one-half the height of the surrounding process units. It has been concluded that the structures associated with the projects will be consistent with the overall character of the refinery, and furthermore, will generally be indistinguishable from the existing equipment, operations and maintenance process units.

Water Intake and Discharge. The #3 Crude Unit Improvements Project includes an upgrade to the #3 Crude Unit desalter with a design that reduces load to the wastewater treatment plant and uses recycled water which avoids increased wastewater flow and water usage. No changes to the existing National Pollutant Discharge and Elimination System (NDPES) permit are needed.

In conclusion, FHR determined that in the absence of air quality, visual impacts, and water intake or discharge impact-related indirect effects, the APE should not be expanded beyond the Preliminary APE that was identified for potential direct effects. The APE is accordingly defined as the area encompassing the existing equipment, operations and maintenance activities.

Historic Properties

A search of the Minnesota State Historic Preservation Office (SHPO) statewide database, was undertaken to obtain information on the known and recorded historic and archaeological sites (cultural resources) in the Study Area and APE. Additionally, the Minnesota Department of Transportation (MnDOT) Historic Roadside Development Structures of Minnesota Trunk Highways (2005) and the MnDOT List of Known Pre-1971 Historic Bridges (updated 12/19/12) was reviewed specific to the resources identified with the SHPO database. Within 3 km Study Area of the projects, two bridges that provide overpass to the Union Pacific Railroad (located approximately 1¼ miles northeast of the projects along the modern Highway 52/55 corridor) were identified as considered eligible for the National Register of Historic Places. No NRHP-listed sites were identified within the Study Area or the APE.

Potential for Effects to National Register Properties/Eligible Properties

The Pine Bend Refinery, included in the APE, has been in existence since the mid-1950s and has already experienced intensive disturbance associated with the equipment, operations and maintenance

of this industrial land use as a refinery. Therefore, there is no potential for direct impacts to historic resources.

Furthermore, the projects do not result in indirect effects that could impact the National Register-eligible resources within the broader Study Area.

Conclusions

Based on archival research retrieved from the Minnesota SHPO and MnDOT reports and records, a concise characterization of the cultural and geoarchaeological nature of archaeological sites near the projects' area was provided. No National Register-listed sites are identified within the APE (the equipment, operations and maintenance footprint). Two eligible sites were identified in the Study Area. However, no potential for direct or indirect effects within the APE or Study Area was identified. Therefore, no potential adverse effects are anticipated to result to any historic properties that would be regulated in accordance with Section 106 of the National Historic Preservation Act.

It is concluded that the proposed projects included in the #3 Crude/Coker Unit Improvements Permit will not adversely affect any historic properties.

1.0 Introduction

Flint Hills Resources (FHR) is proposing modifications to its Pine Bend Refinery located in Rosemount, Dakota County, Minnesota (Figure 1). FHR is applying to the USEPA for a Prevention of Significant Deterioration Permit (PSD) for Greenhouse Gases (GHGs) pursuant to 40 C.F.R. § 52.21. Federal permitting establishes a federal nexus that may require consultation under Section 106 of the National Historic Preservation Act (NHPA) in order for USEPA to consider the effects of this permit action on properties eligible for inclusion in the National Register of Historic Places (NHRP) and to consult with the State Historic Preservation Office (SHPO).

This Cultural Resource Assessment is based on the best available information.

Additional information about the projects is provided in the #3 Crude/Coker Improvements Permit Application (submitted to MPCA on November 16, 2012) and the Endangered Species Act Biological Evaluation prepared in support of the #3 Crude/Coker Improvements Permit Application (submitted to USEPA on January 25, 2013).

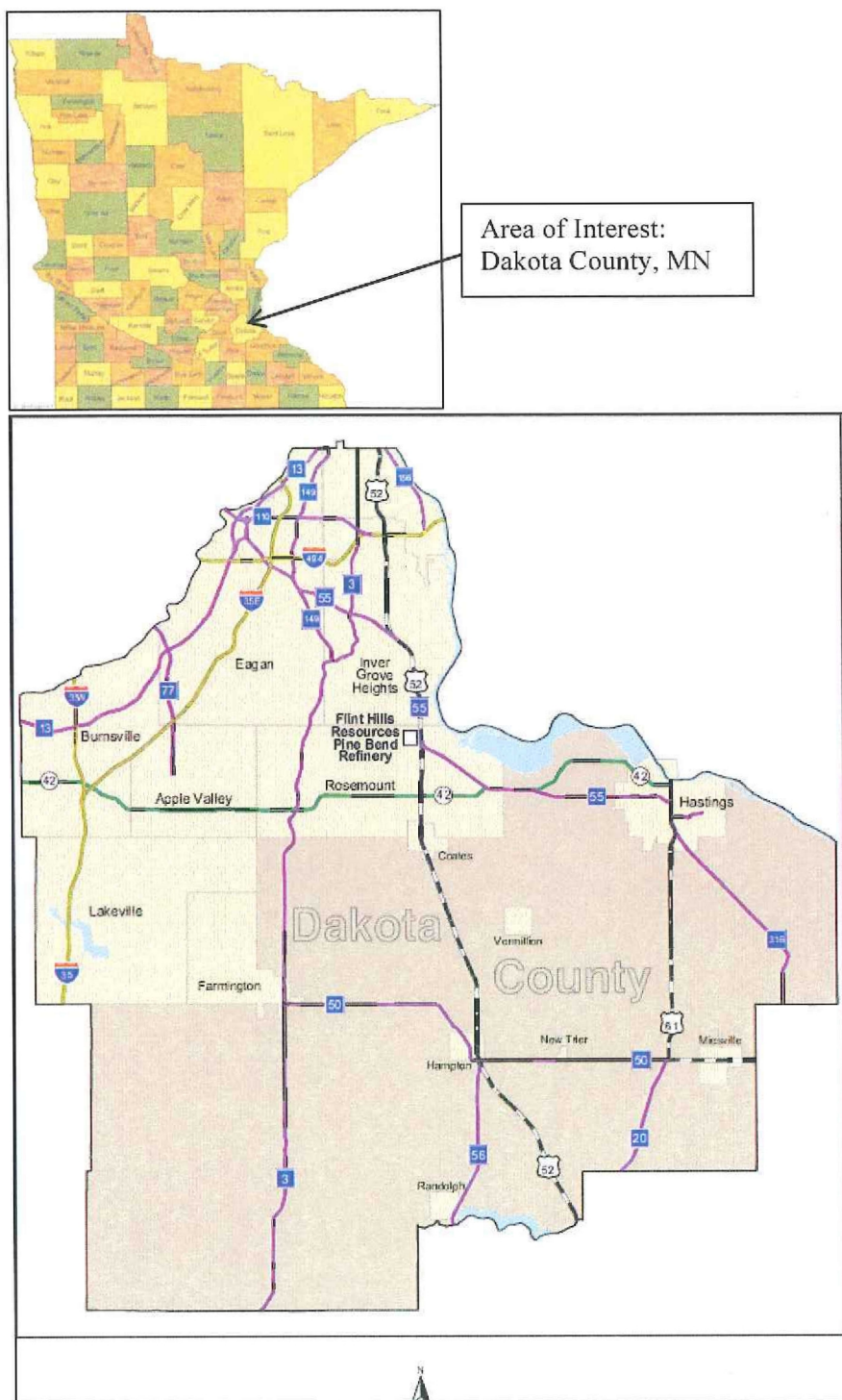


Figure 1 Approximate location of the Flint Hills Resources Pine Bend, LLC Refinery in Rosemont, Dakota County, Minnesota (Source: FHR Pine Bend, LLC)

2.0 Statutory and Regulatory Overview

The proposed modifications require an air permit under the Prevention of Significant Deterioration (PSD) program pursuant to the federal Clean Air Act (CAA). The Minnesota Pollution Control Agency (MPCA) has been delegated authority by the U.S. Environmental Protection Agency (USEPA) to issue PSD permits under the federal PSD regulations set forth at 40 C.F.R. Part 52.

NHPA Section 106 and its revised regulations, 36 C.F.R. Part 800, require MPCA under its delegated authority from USEPA to issue PSD permits to take into account the effects of its actions on historic properties, and to provide the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on those undertakings. Historic properties are defined in Federal law as those properties that are listed in, or meet the criteria for listing in, the National Register of Historic Places (NRHP). This is carried out through consultation with the State Historic Preservation Office (SHPO), and in the case of projects involving tribal lands, with tribal representatives.

The purpose of this Cultural Resource Assessment is to determine whether MPCA, acting with its delegated authority, undertaking the issuance of the PSD permit will affect the historic properties affected by Section 106.

3.0 Project Description

3.1 Project Purpose and Process

FHR has operated the Pine Bend Refinery since 1955. Pine Bend is a major supplier of transportation fuels and energy products to Minnesota and the Upper Midwest. These products include gasoline, diesel fuel, heating oil, jet fuel, petroleum coke, asphalt, and elemental sulfur. FHR distributes these products to customers via pipelines, trucks, barges and rail cars. The Pine Bend Refinery currently has a crude oil processing capacity of about 320,000 barrels per day. FHR Pine Bend's #3 Crude/Coker Improvements permit includes several undertakings that will improve the conversion of crude oil grades into transportation fuels, improve the design of heat input in the 25 Crude Unit, improve the design of heat input in the 23 Coker Unit, and eliminate steam-air decoking emissions at the coker heaters. The projects represent a significant investment in reliability improvements and equipment upgrades that will improve the emissions profile of the facility, not impact ambient air quality, improve heater efficiencies, and ensure sustained, reliable operation of the facility from turnaround to turnaround. The #3 Crude/Coker Improvements permit action covers two separate projects and one emissions reduction project.

The following summarizes the location and context of the improvements.

The #3 Crude Unit Improvements Project Overview. The #3 Crude Unit Improvements Project includes upgrades to the #3 Crude Unit and provides additional cooling water capacity. This project will result in the upgrade of the #6 Cooling Tower, the construction of a new #7 Cooling Tower, or both, to provide additional cooling water capacity. FHR will replace the 25 Crude Unit Charge Heater (25H1) with a new heater (new 25H2) equipped with ultra-low NO_x burners (ULNB) and selective catalytic reduction (SCR) technology and improve heater efficiency via air preheat design, all of which will result in reduced actual nitrogen oxide (NO_x) emissions. The new 25H2 Heater will be installed in the same general location as the old 25H1 Heater. This installation of the 25H2 Heater will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place. The #2 Crude Unit Charge Heater (11H6) will also be upgraded by installation of SCR technology and improved heater efficiency via air preheat design. Additionally, an upgrade will be completed to augment an existing cooling tower (#6 Cooling Tower) with additional cells that will result in a minor addition to the existing footprint of the #6 Cooling Tower. The minor addition to the existing

footprint will be within the previously disturbed equipment, operations, and maintenance footprint of the refinery. Lastly, the addition and construction of the #7 Cooling Tower will disturb a previously disturbed area within the equipment, operations, and maintenance footprint of the refinery.

Excavation will be necessary to construct a permanent 3-foot deep basin beneath the #7 Cooling Tower.

FHR proposes to begin construction activities at the #3 Crude Unit in February 2014 with completion during the fall 2015 turnaround. Changes to the 11H6 heater are proposed to also begin in February 2014 and should be completed in spring 2015. The new #7 Cooling Tower and/or changes to existing #6 Cooling Tower are proposed to begin construction in May 2014 and fall 2014, respectively, with a completion time frame of spring 2015.

The #3 Coker Improvements Project Overview. The #3 Coker Unit Improvements Project involves replacing two (2) heaters (Heaters 23H1 and 23H2) with a single heater (23H3) within the same general location within the equipment, operations and maintenance footprint of the refinery. The new heater will have ULNB and SCR, and will take advantage of energy efficient design. Installation of this new heater will eliminate hydrogen sulfide (H₂S) emissions that occur during infrequent, short-term periods (approximately one day each calendar quarter) of heater decoking. Because the #3 Coker Improvements Project which installs a new 23H3 heater is a separate project from the #3 Crude Unit Improvements Project, the project may or may not proceed even if the #3 Crude Unit Improvements Project proceeds. This assessment takes this optionality into account and highlights sections where not proceeding with this project increases potential impacts to be evaluated. Installation of the 23H3 Heater will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place.

FHR proposes to begin construction activities for the new 23H3 heater and associated equipment on August 2014, with a proposed completion date in fall 2015.

The Coker Fuel Gas Sulfur Reduction Project Overview. A third project is being completed to support sulfur dioxide (SO₂) emissions reductions from fired heaters affected by and included within both the #3 Crude Unit Improvements Project and #3 Coker Improvements Project. This third project will be completed if either the #3 Crude Improvements Project or the #3 Coker Improvements Project are completed. Within the gas recovery system of the #3 Coker Unit, FHR proposes to complete

physical changes to improve cooling and recovery of sulfur compounds that will directly reduce the sulfur content of produced refinery fuel gas that is routed to the 45 fuel gas system (one of the two fuel gas systems in the refinery). The fuel gas sulfur control project will reduce SO₂ emissions at the combined fuel gas systems (GP116 – the 41 and 45 fuel gas systems). This will involve physical changes to the process equipment but no overall physical changes to the footprint of the refinery (*i.e.*, no associated soil disturbance).

The collective permitted SO₂ and NO_x emissions impact of these changes—shutting down three process heaters, installing two new process heaters and upgrading a third heater with ULNB and SCR technology, implementing an emissions reduction project to reduce sulfur content in fuel gas, and accounting for emissions increases at other equipment resulting from the proposed changes—yields a decrease in SO₂ emissions and a decrease in NO_x emissions.²

FHR plans to begin construction activities in fall 2013 with process tie-ins to the #3 Coker Unit. Work will be completed in a time frame to comply with the lower fuel gas SO₂ emissions cap, currently scheduled for spring 2015. This project is described in further detail in Section 2.3 of Appendix A to the #3 Crude/Coker permit application.

3.2 Estimated Air Emissions from the Projects

FHR has evaluated these three projects to determine whether they should be aggregated for PSD regulatory purposes. EPA's policy states that separate changes, which are sufficiently related based on established criteria, should be aggregated into a single common project for the purpose of determining NSR applicability (*i.e.*, determining the project related emissions increases). The aggregation-related policy documents outline an approach that relies upon case-specific factors and the relationship between separate activities. EPA has summarized this case-by-case analysis into five criteria the agency may consider in evaluating multiple projects:

- (1) Filing of more than one minor source or minor modification application associated with emissions increases at a single plant within a short time period.

² For the purposes of NSR applicability, a netting analysis is not conducted so the PSD emission representations in the permit application do not reflect any emission reductions. The above-noted decrease in refinery emissions from the projects is calculated from the project emissions increase under NSR in conjunction with the federally enforceable emissions decreases proposed in this permit action from shutdown units and proposed emissions controls at existing project-affected units.

- (2) Applications for commercial loans . . . to see if the source has treated the projects as one modification for financial purposes.
- (3) Reports of consumer demand and projected production levels.
- (4) Statements of authorized representatives of the source regarding plans for operation, and,
- (5) EPA's own analysis of the economic realities of the projects considered together.”³

Applying these criteria, the #3 Crude Unit Improvements Project and the #3 Coker Unit Improvements Project encompassed in the permit action have separate project drivers, separate funding, and separate economic bases. They are technically feasible and economically viable independent of each other. Nonetheless, to eliminate any permitting uncertainty, and to add an element of conservatism to this application, FHR is voluntarily treating the #3 Crude Unit Improvement Project and the #3 Coker Improvement project together as a single project for purposes of calculating emissions under the PSD air quality program at 40 C.F.R. Part 52. While the #3 Coker Fuel Gas Sulfur Reduction Project affects emission sources in both of the projects described above, that project results in a decrease in SO₂ emissions at refinery fuel gas fired sources and does not increase the emissions rate of other pollutants.

The estimated increases in emissions from the projects for PSD purposes are summarized in Table 2. As described earlier for NO_x and SO₂, enforceable reduction projects are required by permit terms that require emission reductions that are greater than the projected increases from the permit and therefore assure no increases in actual NO_x and SO₂ emissions. It should be noted that although some of the permitted facility emissions increase slightly, the overall facility permitted emissions decrease for some of the pollutants as illustrated in Table 3.

³ January 22, 2003 Memorandum from John B. Rasnic, EPA to George T. Czerniak, EPA Region V titled “Applicability of New Source Review Circumvention guidance to 3M – Maplewood, Minnesota.”

Table 2 Estimated PSD Emission Increases for the #3 Crude/Coker Improvements Permit

Pollutant	PSD Step 1 Emissions Increase ^[4] (tpy)	PSD Significant Emission Rate (tpy)	Above SER?
NO _x	35.78	40	No
SO ₂	31.69	40	No
CO	80.06	100	No
PM	31.35	25	Yes
PM ₁₀	29.57	15	Yes
PM _{2.5}	28.01	10	Yes
VOC	34.74	40	No
SAM ^[1]	0.09	7	No
H ₂ S/TRS ^[2]	1.14	10	No
RSC ^[3]	2.22	10	No
GHGs (as CO ₂ -e)	419,553	75,000	Yes

[1] Sulfuric acid mist (SAM)

[2] Total reduced sulfur (TRS)

[3] RSC: Reduced Sulfur Compounds, as described in 40 CFR 60.101 and 60.641, PSD regulates H₂S, carbonyl sulfide and carbon disulfide as a group referred to as "reduced sulfur compounds."

[4] This emissions increase is for the total of all projects and would be less if the project to install a new 23H3 heater was not completed (see Attachment 1).

Table 3 Actual Emissions Changes Associated with the #3 Crude/Coker Improvements Projects and Comparison to Facility PTE

Scenario Description	NO _x	SO ₂	CO	PM	PM ₁₀	PM _{2.5}	VOC	GHGs (as CO ₂ e)
Existing Facility PTE (tpy) ^[1]	4,265	4,832	2,622	978	589	577	2,585	6,730,691
Total Changes (tpy) ^[2]	-31.3	-3.3	75.6	19.5	17.7	16.1	26.1	272,435
Percent of actual emissions change vs. Total facility PTE	-0.7%	-0.1%	2.9%	2.0%	3.0%	2.8%	1.0%	4.0%
Changes without 23H3 Heater (tpy) ^[3]	-4.1	-4.1	68.4	16.7	15.0	13.4	24.7	208,822
Percent of actual emissions change vs. Total facility PTE without 23H3 Heater	-0.1%	-0.1%	2.6%	1.7%	3.3%	2.3%	1.0%	3.1%

[1] PTE (potential to emit) from FHR's Title V Permit 009 issued January 11, 2013.

[2] Reductions reflect enforceable reductions from baseline actual emissions for the PSD baseline period of 2010 - 2011. See Attachment 1 for additional details.

[3] Identifies emissions changes if the project to install a new 23H3 heater is not completed (see Attachment 1).

3.3 Construction Information

The Pine Bend Refinery has already experienced intensive disturbance associated with the equipment, operation and maintenance of this land use as a refinery. All elements of the proposed construction of the projects will occur within the existing footprint of the refinery, specifically within areas previously disturbed. A summary of the project construction is provided below.

The #3 Crude Unit Improvements Project. The #3 Crude Unit Improvement Project involves replacing an existing heater (25H1) with a new heater (25H2) in the same general location within the previously disturbed equipment, operations and maintenance footprint of the refinery. Installation of the 25H2 will require will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place. Additionally, an upgrade will be completed to augment an existing cooling tower (#6 Cooling Tower) with additional cells that will result in a minor addition to the existing footprint of the #6 Cooling Tower. The minor addition to the existing footprint will be within the previously disturbed equipment, operations, and maintenance footprint of the refinery. Lastly, the addition and construction of the #7 Cooling Tower will disturb a previously disturbed area within the equipment, operations, and maintenance footprint of the refinery. Excavation will be necessary to construct a permanent 3-foot deep basin beneath the #7 Cooling Tower.

The #3 Coker Improvements Project. The #3 Coker Improvements Project involves replacing two (2) heaters (Heater 23H1 and 23H2) with a single heater (23H3) within the same general location within the equipment, operations and maintenance footprint of the refinery. Installation of the 25H3 will require will require disturbance within the previously disturbed equipment, operations, and maintenance footprint of the refinery - approximately 1/3-acre to depths of approximately 15 feet to accommodate the installation of pile. The excavated area will be backfilled after the pile cap is in place.

The Coker Fuel Gas Sulfur Reduction Project. This will involve physical changes to the process equipment but no overall physical changes to the existing equipment, operation or maintenance footprint (*i.e.*, no associated soil disturbance).

4.0 Determination of Study Area and Area of Potential Effect

For purposes of MPCA's consultation under Section 106 of the NHPA, an "area of potential effect" is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." 36 C.F.R. § 800.16(d). For purposes of MPCA's consultation with USFWS for purposes of Section 7 of the Endangered Species Act, "direct effects" are to be understood as those "direct or immediate effects of the project on the species or its habitat," U.S. Fish & Wildlife Service, "Section 7 Consultation Handbook" at 4-25 (1998), and "indirect effects" "are caused by or result from the proposed action, are later in time, and are reasonably certain to occur." *Id.* at 4-27. Further, "[i]ndirect effects may occur outside of the area directly affected by the action." *Id.* The federal NHPA regulations set forth the criteria of "adverse effects," which are functionally similar to the Section 7 definitions of direct and indirect effects. *See* 36 C.F.R. § 800.5(a)(1) (setting forth criteria of adverse effect, which are functionally similar to the Section 7 definitions of direct and indirect effects).

Also, in accordance with Minnesota State Historic Preservation Office (SHPO) Section 106 compliance guidance, the definition of adverse effect further assists in the review of potential direct and indirect effects – "Adverse effects can be direct or indirect and include effects that are reasonably foreseeable and cumulative. Typical adverse effects include: demolition or damage; alterations inconsistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, relocation of the property; change in the property's use or setting, introduction of audible, atmospheric or visual elements that diminish the property's significant features; and transfer, sale, or lease of property out of federal ownership or control without appropriate preservation restrictions or covenants."

FHR identified the APE for the projects using the following step-wise approach.

4.1 Step One: Identify the Study Area

First, FHR identified a Study Area, which is defined as the zone within which potential direct and indirect effects may possibly be discerned. Aside from providing important regional context for the projects, the Study Area sets the outer boundaries for FHR's assessment of direct and indirect effects.

The Study Area for the projects was determined considering the following:

1. The potential for impacts from air emissions is often described as local or regional in scale. The term “local” is typically defined as being within about 10 to 100 kilometers of the emission source (USEPA 1997). For this CRA, the potential for air impacts was considered to be within 10 kilometers.
2. For the two previous screening ecological risk analyses conducted for the Pine Bend Refinery, a 10 kilometer project area was assessed (Barr Engineering, 2007b; 2008). In both analyses the maximum modeled air concentrations occurred at the property boundary and decreased with distance from the property boundary. For both analyses, the modeled air concentrations and estimated media concentrations at the facility property boundary and at all other locations on the modeling receptor grid were below background concentrations and levels of concern.
3. Based on these prior analyses, initially assessing potential impacts to cultural resources (including archaeological and historical) out to a distance of 3 kilometers from the property boundary, a potential zone of influence, is considered sufficiently inclusive.
4. For the current proposed projects, PSD modeling results (PM_{10} and $PM_{2.5}$) demonstrate compliance with the SILs at the property boundary, which further supports the use of a 3 km Study Area beyond the property boundary.

Considering these factors as well as the exercise of best professional judgment, the Study Area for the proposed projects is the area extending 3 kilometers (km) beyond the Pine Bend Refinery property boundary and includes an area sufficient to identify the presence of potential receptors (Figure 2). For example, the air quality impacts assessment establishes modeling receptors across the entire Study Area for the quantitative modeling exercises. As set forth in more detail below, the analysis of potential direct and indirect impacts within the 3 km-based Study Area demonstrates that the extent of the Study Area is more than adequate to capture discernible potential direct and indirect effects to cultural resources.

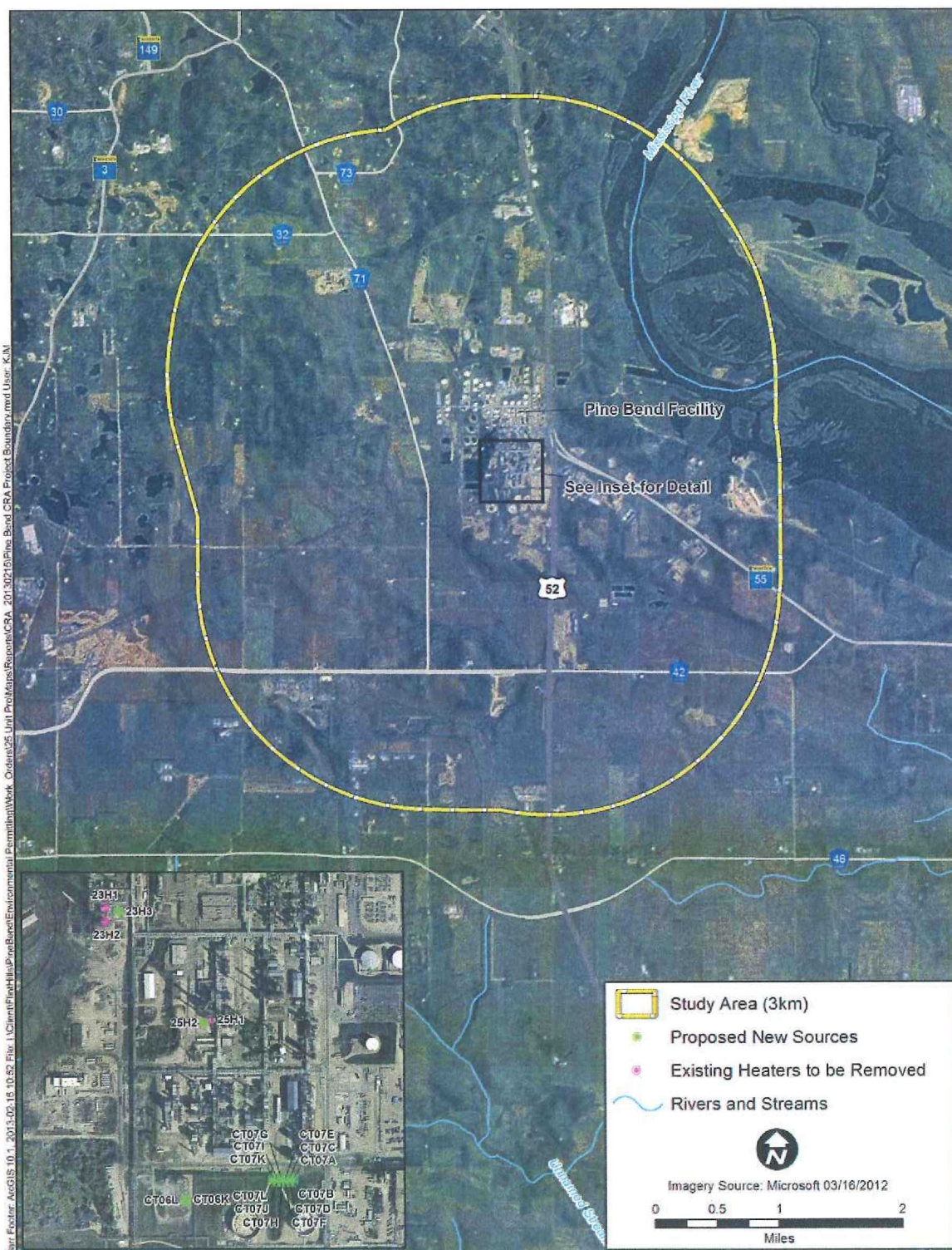


Figure 2 3 km Study Area

4.2 Step Two: Identify the Area of Potential Direct Effects

Second, FHR established a Preliminary Area of Potential Effect (APE) based on the potential direct effects of the projects. The potential direct effects from the projects include the immediate potential effects of construction and operation of the projects (*e.g.*, ground disturbance).

4.2.1 Ground Disturbance and Construction Activities

The direct impacts to land (*i.e.*, ground disturbance) from these projects do not extend outside the existing equipment, operations and maintenance footprint of the refinery and do not involve any additional land conversion activities. Construction of the 25H2 and 23H3 will require further disturbance within the previously disturbed process area of approximately 1/3-acre each to a depth of approximately 15 feet to install piling/piling cap. The excavation will be backfilled once pile cap is installed. For #6 Cooling Tower upgrades, minimal disturbance will occur to provide the staging area for the addition of cells to the #6 Cooling Tower. The #7 Cooling Tower will disturb a previously disturbed area slightly greater than one acre to the east of the #6 Cooling Tower. Excavation will be necessary to construct a permanent 3-foot deep basin beneath the #7 Cooling Tower. There will be no disturbance of currently green or previously undisturbed areas. These ground disturbance and construction areas essentially identify the Preliminary APE for direct effects.

4.3 Step Three: Identify the Area of Potential Indirect Effects

FHR assessed whether any potential indirect effects within the Study Area should cause the Preliminary APE to be expanded to include an area of indirect effects by assessing the potential for effects from modeled air concentrations of particulate.

4.3.1 Air Emissions

The emission inventory for the proposed projects indicates that estimated emissions increases for NO_x, SO₂, CO, VOC, H₂S/TRS, SAM and RSC are all below the respective significant emission rates (SER) for PSD permitting (Table 2). Emission estimates below the PSD SER thresholds are indicative of minimal contributions from the projects to ambient air concentrations. Because of the minimal contributions to ambient air concentrations, no impacts to cultural resources are expected from these pollutants from the proposed projects.

With respect to air pollution-related effects, FHR would offer the observation that because the proposed MPCA action is the issuance of a PSD permit for GHGs, PM₁₀, and PM_{2.5}, the indirect effects of air pollution should be limited to the indirect effects of GHG, PM₁₀, and PM_{2.5} emissions authorized by the proposed MPCA action. FHR has included an analysis of the potential indirect

effects of PM₁₀ and PM_{2.5}. But because the Department of the Interior has determined that impacts from GHG emissions need not be considered under Section 7 (DOI 2008), indirect effects from GHG emissions were not evaluated.

Even though the projects do not trigger PSD requirements for NO_x and SO₂, FHR has included an analysis of the potential indirect effects of those emissions. Because the net emissions increase of NO_x and SO₂ is zero (or less), the Project will result in no NO_x or SO₂ air emission-related potential indirect effects.

FHR evaluated the PSD pollutants in Table 1 for their potential to affect cultural resources:

- Particulate (PM₁₀, PM_{2.5}) (quantitative; modeling results)
- NO_x and Ammonia (NH₃) (potential for nitrogen deposition) (qualitative)
- SO₂, SAM, H₂S, and RSC (potential for sulfur deposition) (qualitative)

PSD pollutants in Table 1 for which FHR did not perform an assessment include the following:

- Particulate metals. This pollutant is typically not evaluated for potential impacts to cultural resource receptors
- Volatile organic carbons. This pollutant is typically not evaluated for potential impacts to cultural resource receptors
- GHGs. Local effects are not expected from these pollutants and they were not evaluated in accordance with Department of the Interior guidelines on considering GHGs in Section 7 consultations (DOI 2008).
- CO. This pollutant is typically not evaluated for potential impacts to cultural resource receptors. Because the estimate of combined project emissions (80 tpy) is below the PSD screening rate (100 tpy), no potential ecological impacts are expected and CO was not evaluated.

The results of quantitative air quality impact assessments show that modeled PM₁₀ and PM_{2.5} air concentrations at all model receptors were below significant impact levels (SILs). The results of qualitative air quality impact assessments also show only insignificant potential effects.

Consequently, the Preliminary APE was not expanded to account for air quality-related indirect effects. FHR determined that in the absence of air quality-related indirect effects within the Study Area, the APE should not be expanded beyond the Preliminary APE. Nevertheless, FHR has defined

the APE as extending beyond the Preliminary APE to the property boundary of the Pine Bend Refinery.

4.3.1.1 Emission Changes

Table 3 indicates that the projects result in an overall reduction in NO_x and SO₂ emissions compared to the facility PTE. For all non-GHG pollutants, the overall net reduction in emissions, or the small net increase in emissions, indicates there are likely no impacts to cultural resources from the proposed projects.

4.3.1.2 Modeled Criteria Pollutant Air Concentrations

Potential particulate air emissions (PM₁₀ and PM_{2.5}) associated with the proposed projects are primarily particulate from fuel gas firing from process heaters and crystallization of dissolved solids entrained in cooling tower mist. Particulate emission modeling is required for PSD air permitting. Modeled air concentrations reported in the proposed modeling protocol for the projects for both PM₁₀ and PM_{2.5} were below the SIL at the property boundary. Modeled air concentrations declined with distance from the property boundary, meaning that air concentrations were well below the respective SIL at the more distant locations on the receptor grid.

Compliance with SILs at the property boundary indicates minimal contribution from the projects to ambient air concentrations. In addition, compliance with SILs at the property boundary indicates a very small zone of influence for the proposed projects; no impact at the property boundary. These modeling results indicate that the projects will not have an effect on any potential cultural resource receptors in the Study Area.

4.3.1.3 Emissions of Nitrogen (NO_x and Ammonia) and Potential Effects to Cultural Resources

Table 2 identified that NO_x emissions for the proposed projects are below the PSD significant emission rate. Permit terms require heater shutdowns which assure that NO_x emissions will not increase as a result of the projects (Table 3) and therefore will not have any direct effects on cultural resources and will not increase local deposition of nitrogen.

Ammonia is not a criteria pollutant but is a relevant pollutant with regard to potential nitrogen deposition and potential emissions were estimated for the projects. If all projects proceed, which represents the highest emissions increase for ammonia, there will be approximately 20.1 tpy of ammonia emissions due to the use of selective catalytic reduction (SCR) on several stacks to reduce NO_x emissions. Most of the concern with ammonia emissions is the potential for nitrogen deposition

in nearby areas because ammonia is “relatively soluble in water and may be subject to both wet and dry deposition” (Upadhyay et al., 2008).

A screening estimate of potential nitrogen deposition that may be associated with the estimated ammonia emissions from the proposed projects is approximately 0.16 kg N/(ha•yr) (Table 4). Background total nitrogen deposition is estimated at 4 kg N/(ha•yr) for the Twin Cities area based on monitoring data from the Cedar Creek Natural History Area for the 2008 to 2010 time period (as measured by the National Atmospheric Deposition Network, NADP; Site MN01). The potential nitrogen deposition of 0.16 kg N/(ha•yr) that may be associated with the projects’ potential ammonia emissions is about 4% of background. The potential small increase in nitrogen deposition that may be associated with the proposed projects is not significant compared to current background deposition. In addition, adding the potential incremental increase from the projects with background ($4 \text{ kg/ha} + 0.16 \text{ kg/ha} = \sim 4.2 \text{ kg N/(ha•yr)}$), is below the deposition thresholds of 5 to 10 kg N/(ha•yr) suggested by Krupa (2003). Therefore, no effects to nearby cultural resources are expected to be associated with the potential ammonia emissions from the proposed projects.

Table 4 Estimated Deposition of Nitrogen from Potential Ammonia Emissions Associated with the #3 Crude/Coker Improvements Permit ^[1]

Data	Calculations or Factors	Comments
Emissions = 20.1 tpy 40,200 pounds/year 18,250,800 grams/year	2000 pounds per ton 454 grams per pound 1,000 grams = 1 kilogram (kg)	
Deposition Area: 12 km x 12 km 144 square km 144,000,000 sq. meters	1,000 meters per 1 kilometer (km) 1,000,000 sq. meters per 1 sq. km 10,000 sq. meters = 1 hectare	Deposition area of 12 km x 12 km is consistent with the Dennis et al. (2010) modeling analysis that identified that 8 to 15% of ammonia emissions from a source deposited near the emission source.
Calculation 1: All of the ammonia deposits	Annual Deposition = 18,250,800 grams/yr 144,000,000 sq. meters = 0.127 grams/sq. meter = 1.27 kg/ha	Very conservative assumption that all of the ammonia emitted to the air would deposit locally (within about 10 kilometers of the emission source)
Calculation 2: 15% of the ammonia deposits	Annual Deposition = 1.27 kg/ha x 0.15 = 0.19 kg/ha	Estimate that 15% of ammonia emissions deposit locally is consistent with Dennis et al. (2010).
Calculation 3: 15% of the ammonia deposits as Nitrogen (N)	Annual Deposition as N = 0.19 kg/ha x 0.82 = 0.16 kg/ha	Molecular weight of N = 14 Molecular weight of H = 1 Molecular weight of NH ₃ = 17 N = 82% of NH ₃
Background Deposition (annual)	~ 4 kg/ha	National Atmospheric Deposition Program, Site MN01 (Cedar Creek Natural History Area); average for the 2008 to 2010 time period. (http://nadp.sws.uiuc.edu/ntn/)
Background N + 15% of Project Ammonia (as N)	4 kg/ha + 0.16 = 4.16 kg/ha	Effects-level deposition: 5-10 kg/ha

[1] The nitrogen deposition is for the completion of all permit projects and would be lower if the project to install the new 23H3 heater was not completed (see Attachment 1).

Permit terms require heater shutdowns which assure that NO_x will not increase as a result of the projects and will not increase local deposition of nitrogen. As shown in Table 4, potential nitrogen deposition related to ammonia emissions will be below guideline values. When reductions in NO_x emissions are taken into account, the potential deposition of nitrogen due to the projects will be less than estimated in Table 4. Nitrogen emissions associated with the projects are not expected to have an impact to cultural resource receptors.

4.3.1.4 Emissions of Sulfur (SO₂, SAM, H₂S and RSC) and Potential Effects to Cultural Resources

Table 2 identified that SO₂ emissions for the proposed projects are below the PSD significant emission rates. Permit terms require heater shutdowns and reduced fuel gas SO₂ emissions which assure that SO₂ will not increase as a result of the projects and therefore will not have any direct effects on cultural resources and will not increase local deposition of sulfur.

The combined project increases in SAM (0.09 tpy), H₂S (1.14 tpy) and RSC⁴ (2.22) do not exceed the respective PSD SERs. This analysis does not take into account the expected reduction in SAM from the fuel gas sulfur reduction project or the reduction in reduced sulfur compounds from coker vent improvements that, if included, would result in even lower emissions than estimated here. Because these sulfur species have estimated project emissions below the respective SERs the projects are not expected to have any direct or indirect impacts to cultural resources in general (*i.e.*, insignificant potential for oxidation of reduced S to SO₄ and minimal potential for local deposition of sulfur).

4.3.1.5 Acid Deposition and Material/Structural Components of Cultural Resources

There is a recognized association between the deposition of NO_x and SO₂ (or the gasification of atmospheric pollutants associated with acid or precipitation deposition) and impacts to materials and structures including the material and structural components of cultural resources. Since 1980 when the U.S. Congress passed the Acid Deposition Act, which established that the National Acid Precipitation Assessment Program (NAPAP) would be responsible for acid precipitation assessment, there has been focused study on the impacts to materials and structures. The National Science and Technology Council (NSTC) Committee on Environment operating under NAPAP is responsible for this work. While the details of the mechanisms involved in pollutant-induced deterioration of materials (*e.g.*, cultural resource structures) are not fully understood and continue to be studied, various kinds of research are expanding the base of knowledge available to address the problem which has lead researchers to conclude that any increase or addition of atmospheric pollution resulting in short-range transport/dry deposition or long-range transport/wet deposition has the potential to result in material and structural impacts from air emissions or through the potential formation of acid gases and/or deposition.

⁴ H₂S is a subset of RSC, and therefore should not be double counted when evaluating sulfur compound increases.

Because sulfur and nitrogen have estimated reductions in emissions associated with the projects, the overall effect of the proposed projects is not to increase emissions. Therefore, the projects are not expected to have an impact to cultural resources from acid deposition related to either pollutant.

4.3.2 Visual Impacts (Height of Structures)

New structures associated with the projects will be constructed within and amidst the existing equipment, operations and maintenance footprint of the refinery. Within the footprint of the refinery there is currently a broad distribution of structures 200 feet or greater. Refer to Photos below.



The following provides general details of the projects relative to the evaluation for visual impacts.

The #3 Crude Unit Improvements Project. The #3 Crude Unit Improvement Project involves replacing an existing heater (25H1) with a new heater (25H2) in the same general location within the equipment, operations and maintenance footprint of the refinery. The prominent height feature of the new heater will be the stack. As proposed, the new heater stack would be reduced in height from the current stack (approximately 213 feet), which will be eliminated. The upgrades to the #6 Cooling Tower would not result in a height change from the existing. The #7 Cooling Tower will introduce new structures that are less than one-half of the height of the surrounding equipment, operations and maintenance units.

The #3 Coker Improvements Project. The #3 Coker Improvements Project involves replacing two heaters (Heater 23H1 and 23H2) with a single heater (23H3) within the same general location within the central portion of the equipment, operations and maintenance footprint of the refinery. The most prominent height feature of the heater is the stack. As proposed, the new stack will be approximately the same height (190 feet) as the existing and, the one stack will replace the two existing stacks.

The Coker Fuel Gas Sulfur Reduction Project. No changes will be made to add structures to the site or to affect the heights of existing structures.

The projects will generally be indistinguishable from the existing character of the refinery and therefore, not result in visual impacts to the surrounding resources. Therefore, the Preliminary APE does not require expansion to address potential effects from new structure heights.

4.3.3 Water Intake and Discharge

The projects do not require an increase in allowable water appropriation (well water use).

The wastewater discharge location to the Mississippi River is approximately one-half mile to the east of the refinery processing area. Wastewater discharge will not change with the construction and operation of the project emission units. These projects replace and upgrade the #3 Crude Unit desalter unit which is a key water user and wastewater source. The desalter design increases use of recycled water rather than fresh water. The new desalter improves the settling time within the desalter which is expected to reduce the peak loading to the wastewater treatment plant. Therefore, the projects are expected to remain neutral on wastewater flow and to reduce peak wastewater treatment loads which assure that treatment plant flow and load will remain within the historical

variability of the wastewater treatment plant. The projects do not increase storm water generation and do not expose additional soils/materials to the potential for storm water runoff.

Overall, the projects will not require additional water or increase water discharges (wastewater or storm water). As such, the Preliminary APE for potential indirect effects does need to be expanded to include wastewater or storm water discharge locations.

4.3 Step Four: Define the Area of Potential Effect

Based on the foregoing steps, FHR defines the APE as the area within the facility property boundary that is encompassed by the existing equipment, operations, and maintenance areas of the refinery where the projects are estimated to have potential direct effects based on ground disturbance activities and general construction. However, as noted above, the APE has been expanded out to the existing facility property boundary.

Other factors that were evaluated but do not expand the APE include the following:

- 1) The air dispersion modeling results demonstrate that $PM_{10}/PM_{2.5}$ ambient air concentrations at the facility property boundary are less than the Significant Impact Levels (SILs). Modeling below the respective SIL at the property boundary indicates a very small area for potential direct and indirect impacts from air emissions and also supports the 3- km radius from the property boundary as the potential Study Area.
- 2) As proposed, the projects replace existing equipment with equipment of similar or reduced height in generally the same location (*i.e.*, 25H2 and 23H3); improve existing equipment with no height increase (*i.e.*, #6 Cooling Tower); and where new process units are introduced, the height of the new units is significantly less than that of the surrounding process units (*i.e.*, #7 Cooling Tower less than one-half the height of the surrounding units). Because the projects will not introduce a visual intrusion inconsistent with the existing refinery and footprint, there is no visual impact requiring expansion of the APE.
- 3) The projects do not require any additional water intake (from groundwater wells). Because there is no water intake from a river or other surface water body, water use/intake does not expand the APE.
- 4) The projects are expected to have a neutral effect on wastewater and storm water discharge volume. No changes to the current NPDES permit have been identified. Therefore, the storm water and wastewater discharge locations do not expand the APE.

Overall, FHR determined that in the absence of air quality, visual and water intake or discharge impact-related indirect effects, the APE should not be expanded beyond the Preliminary APE that was identified for potential direct effects.

5.0 Resource Inventory for Study Area and APE

A search of the Minnesota State Historic Preservation Office (SHPO) statewide database was undertaken to obtain current information on the known and recorded historic and archaeological sites (cultural resources) in the Study Area and APE. Additionally, the Minnesota Department of Transportation (MnDOT) Historic Roadside Development Structures of Minnesota Trunk Highways (2005) and the MnDOT List of Known Pre-1971 Historic Bridges (updated 12/19/12) was reviewed. This section summarizes the results of this research. This search permits a concise characterization of the cultural and geoarchaeological nature of sites that are situated within and around the project area, as presented below.

5.1 Minnesota SHPO File Search Results

A file search was requested from the SHPO on Wednesday, January 23, 2013 for the Study Area, including the APE.

Based on the SHPO file search, three sites are identified as “considered eligible” for the National Register of Historic Places.

- Pine Bend Marker (DK-IVG-023)
- Bridge No. 9108 (mis-referenced in SHPO records as Bridge No. 9106) (DK-IVG-027)
- Bridge No 9109 (DK-IVG-028)

No National Register-listed sites were identified.

5.2 Minnesota Department of Transportation Reports Review

MnDOT’s Cultural Resources Unit (CRU) is a significant repository of cultural resource information for the State of Minnesota. Furthermore, SHPO and CRU routinely consult regarding cultural resource reviews and reporting in Minnesota. The following summarizes the additional analysis completed through MnDOT’s CRU resources specific to the sites identified through review of the SHPO database.

Pine Bend Marker: According to the SHPO file search, the location of the Pine Bend Marker would be within the footprint of the recently constructed Trunk Highway 52/117th Street interchange (constructed in early 2002), which was reviewed by MnDOT CRU and SHPO as a part of the Minnesota Environmental Policy Act (MEPA). As such, it was determined that MnDOT’s records

regarding the Pine Bend Marker had the potential to better characterize the resource. Upon reviewing the 2005 Historic Roads Development Structures on Minnesota Trunk Highways report, it was determined that the Pine Bend Marker was “razed” (relocated or demolished) as a result of a MnDOT project and is no longer eligible. MnDOT’s Historic Roadside Development Structures Inventory states that the Pine Bend Marker is “now ineligible”.

Bridge No. 9108 (referenced as Bridge No. 9106 in the SHPO file search): The MnDOT List of Known Pre-1971 Historic Bridges (updated 12/19/12) confirmed that Bridge No. 9108 along Highway 52/55 (an overpass to Union Pacific Railroad) is eligible.

Bridge No. 9109: The MnDOT List of Known Pre-1971 Historic Bridges (updated 12/19/12) confirmed that Bridge No. 9109 along Highway 52/55 (an overpass to Union Pacific Railroad) is eligible.

Refer to Figure 3 for the location of the aforementioned sites.

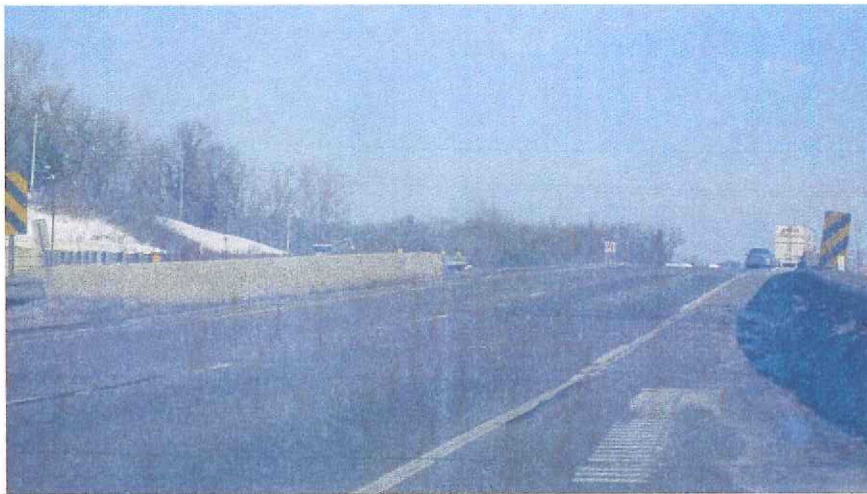


Figure 3 Cultural resources within 3 km Study Area

5.3 Potential for Effects

Within the Study Area and APE, there are no identified National Register-listed archaeological or historic sites (cultural resources). There are two historic sites identified as eligible. These are Bridge No. 9108 and Bridge No. 9109. (photos below.) Both are pre-stressed concrete stringer/multi-beam or girder bridges built in 1958 that demonstrate the early use of pre-stress concrete.

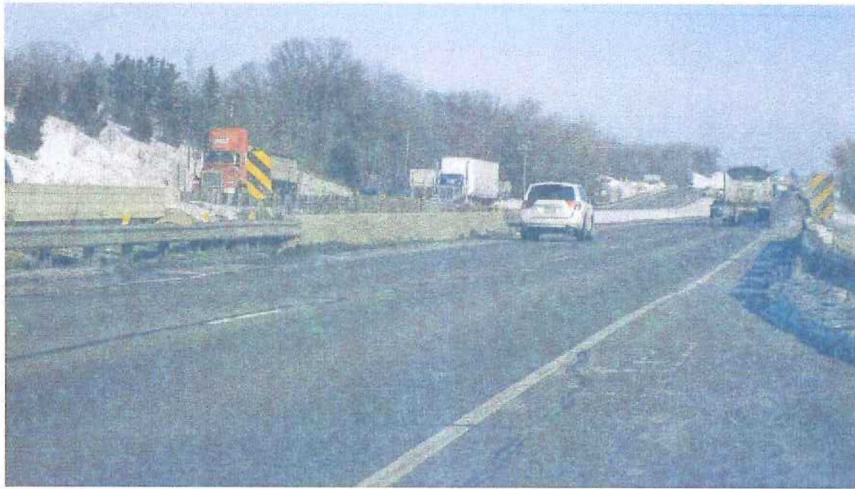
Due to the distance from the projects and the absence of a potential for indirect effects, no adverse effect is anticipated to result to cultural resources within the APE or the Study Area.



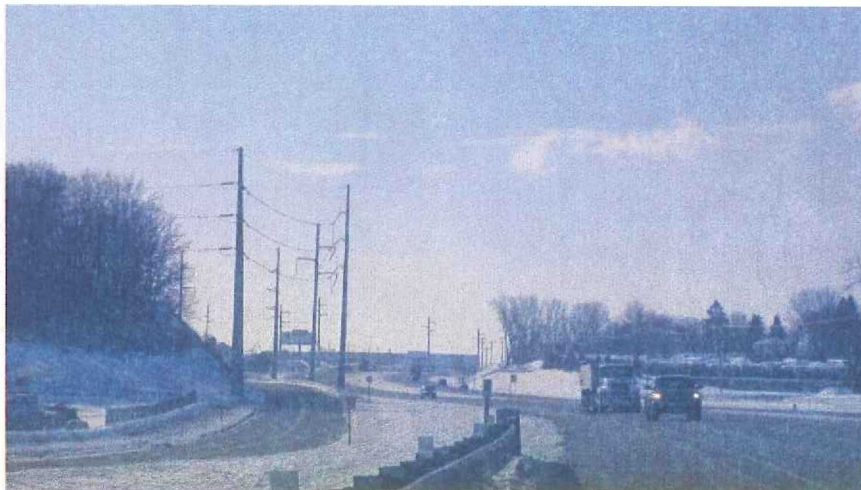
Bridge 9108 on Trunk Highway 52/55 Northbound



Bridge 9108 Looking South Towards Project Area



Bridge 9109 on Trunk Highway 52/55 Northbound



Bridge 9109 Looking South Towards Project Area

6.0 Effects of the Action

Based on archival research retrieved from the Minnesota SHPO and MnDOT reports and records, a concise characterization of the cultural and geoarchaeological nature of archaeological sites near the project area was provided. No National Register-listed sites are identified within the APE (the equipment, operations and maintenance footprint). Two eligible sites were identified in the Study Area. However, no potential for direct or indirect effects within the APE or Study Area was identified. Therefore, no potential adverse effects are anticipated to result to any historic properties that would be regulated in accordance with Section 106 of the National Historic Preservation Act.

7.0 Summary and Conclusion

MPCA's undertaking of the issuance of a PSD permit, with delegated authority from the USEPA, will not result in adverse effects to any historic properties within the Study Area or within the APE.

8.0 References Cited

36 CFR 800 Protection of Historic Properties

Minnesota Department of Transportation List of Known Pre-1971 Historic Bridges (updated 12/19/12).

References Cited

Minnesota State Historic Preservation Office file search [January 23, 2013]

Minnesota State Historic Preservation Office Review and Compliance FAQ

Accessed on March 5, 2013 at: <http://www.mnhs.org/shpo/review/faq.htm>

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2005 National Acid Precipitation Assessment Program Report to Congress: An Integrated Assessment

Susan Granger, Scott Kelly and Kay Grossman, Gemini Research – Morris, Minnesota. Minnesota Department of Transportation Historic Roads Development of Structures on Minnesota Trunk Highways (2005).